GREAT LAKES FOREST RESEARCH CENTRE
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Results of forest insect and disease surveys in the CENTRAL REGION of Ontario, 1984

CARRIED OUT BY THE GREAT LAKES FOREST RESEARCH CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES

H.J. Evans, R.J. Sajan and H. Brodersen

Miscellaneous Report No. 22

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THE GREAT LAKES FOREST RESEARCH CENTRE

The Great Lakes Forest Research Centre is one of six regional establishments located across Canada and operated by the Canadian Forestry Service. The overall objective of the Service is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. The Centre pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

Forestry problems are continually assessed by the Canada-Ontario Joint Forestry Research Committee, made up chiefly of senior members of the Centre and the Ontario Ministry of Natural Resources. The Committee ensures that the research resources of both agencies are effectively transmitted to the forest managers in order to improve forest production and protection, and the quality of the environment.

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The Centre recognizes that forested land must be managed in the best public interest, not only for the wood production essential to our economy but also for the recreational purposes that are so important to our social well-being. These goals must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE CENTRAL REGION OF ONTARIO, 1984

(FOREST DISTRICTS: HURONIA, LINDSAY, CAMBRIDGE, MAPLE AND NIAGARA)

H.J. EVANS, R.J. SAJAN and H. BRODERSEN

GREAT LAKES FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

GOVERNMENT OF CANADA

1985

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SURVEY HIGHLIGHTS

The 1984 field season in the Central Region was highlighted by the population declines of several insect species. These included oak leaf shredder, cedar leafminer, and both birch and oak skeletonizers. Increased population levels were recorded for the larch casebearer and fall webworm, whereas levels of perennial pests such as the birch leafminer remained static. Endemic population levels of the gypsy moth were monitored, while surveys for the European race of Scleroderris canker produced negative results. Surveys were conducted for Eutypella canker of maple, Armillaria root rot and dieback condition of maple, oak and ash as well as for abiotic factors such as frost and winter drying.

Special surveys of conifer plantations and of seed and cone pests were conducted, with white spruce being the species examined this year. Surveys were also conducted for pests which have been found in adjoining provinces but not yet in Ontario, e.g., the birch casebearer. Results of this survey were negative. The gypsy moth larval and adult trapping program in provincial parks was repeated. Special emphasis was placed on detection of ash yellows, a condition associated with ash dieback. As part of a province-wide survey a plot was established in the Central Region to forecast and detect acid precipitation damage to the forest.

Personnel changes occurred in the Forest Insect and Disease Survey Unit with the retirement of H.J. Weir and the transfer of C.A. Barnes in 1983. R.J. Sajan is now responsible for the Lindsay District and H. Brodersen covers the Niagara District. H.J. Evans continues to work in the Cambridge, Huronia and Maple districts.

The format for this report remains unchanged from that of 1983. Insects and diseases are categorized as follows:

Major Insects or Diseases

capable of causing serious injury to or death of living trees or shrubs

*Minor Insects or Diseases**

capable of sporadic or localized injury but not usually a serious threat to living trees or shrubs

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

1) those which are of minor importance and have not been known to cause serious damage to forest trees

*No minor diseases were reported in the Central Region in 1984.

Frontispiece

Windsnap of main stem at the point of canker caused by Eutypella canker, *Eutypella parasitica* Davidson & Lorenz

Webbing and defoliation of ash (*Fraxinus* spp.) caused by the fall webworm, *Hyphantria cunea* (Dru.)

2) those which are capable of causing serious damage but, because of low populations or for other reasons, did not cause serious damage in 1984.

The valuable assistance and cooperation of personnel of the Ontario Ministry of Natural Resources, Agriculture Canada, other government agencies and private individuals during the 1984 field season are gratefully acknowledged.

H.J. Evans

R.J. Sajan

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INSECTS

Major Insects

Pine False Webworm, *Acantholyda erythrocephala* (L.)

Population levels of the pine false webworm remained similar to those encountered in 1983. Quantitative data (Table 1) reveal both increases and decreases at specific locations. Damage to the old foliage was generally low (less than 25%) at these locations; however, small trees (0.5-2.0 m high) often sustained heavier damage. In several instances all the old foliage was consumed by the pest on the smaller trees. Populations were observed on white pine (*Pinus strobus* L.), red pine (*P. resinosa* Ait.), jack pine (*P. banksiana* Lamb.), mugho pine (*P. mugho* Turra var. *mughus* Zenari), and Scots pine (*P. sylvestris* L.).

The insect remains the most common and abundant pest in the Huronia District, where most young pine stands are affected to some degree. In the Lindsay, Cambridge and Maple districts, occasional plantations are infested.

Table 1. Summary of damage caused by the pine false webworm in four districts in 1984 (counts based on the examination of 150 trees at each location).

Location (Twp)	Host	Avg ht of trees (m)	Affected area (ha)	Trees infested (%)		Foliar damage (%) [a]	
				1983	1984	1983	1984
Cambridge District							
Puslinch	wP	1.0	5	22	35	15	15
Maple District							
Albion	rP	2.0	2	10	10	5	12
Lindsay District							
Bexley	wP	5.0	10	88	97	46	7
Huronia District							
Sunnidale	rP	0.8	2	50	60	40	30
Mono	rP	1.2	12	12	22	8	17
Tosorontio	rP	1.8	12	22	57	10	22
Nottawasaga	rP	1.7	10	-	13	-	7
Flos	rP	2.8	2	-	80	-	10
Tiny	scP	2.0	10	-	65	-	20
Medonte	rP	1.4	8	-	12	-	6
Orillia	rP	2.7	4	-	20	-	7

[a] Damage to old foliage only

Fall Cankerworm, *Alsophila pometaria* (Harr.)

In the Cambridge District only light damage occurred to Manitoba maple *(Acer negundo* L.) at locations in North Dumfries, Brantford and Onondaga townships where moderate and severe damage had occurred in 1983. In the Maple District, approximately 200 ha were lightly defoliated in the wooded area in the north part of the city of Richmond Hill and in Uxbridge Township. Foliar damage averaged 20% at both locations; however, some individual trees sustained 100% defoliation. Most deciduous species were affected in the infested areas of the Maple District.

Cedar Leafminers, *Argyresthia aureoargentella* Brower, *A. canadensis* Free., *A. thuiella* Pack. and *Pulicalvaria thujaella* (Kft.)

Populations of this complex of leafminers on eastern white cedar *(Thuja occidentalis* L.) have been gradually declining for the past few years across the Region. In 1984, light and occasional moderate defoliation occurred in scattered pockets in much of the previously heavily infested areas. A total area of approximately 1,000 ha remains affected as follows: Maple District, 400 ha, Cambridge District, 200 ha and Huronia District, 400 ha. Traces of damage occurred in the Niagara and Lindsay districts.

Oak Skeletonizer, *Bucculatrix ainsliella* Murt.

In 1983 most red oak *(Quercus rubra* L.) stands through the districts of Maple, Cambridge and Niagara suffered moderate or severe damage from this pest. This year a major decline occurred in populations of the insect. In the Niagara District, the insect was still common but at low levels and, in spite of two generations, the resultant damage was light at all locations checked. In the Cambridge District, except for a 40-ha woodlot in Oakville where moderate damage occurred, light damage prevailed in most oak stands. Population reductions were even more dramatic in the Maple District where only trace incidence of the pest was recorded. The insect was not recorded at all in either the Lindsay or Huronia districts in 1984.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.

For the past two years this insect had caused severe foliar damage to white birch *(Betula papyrifera* Marsh.) in the Region, particularly in the Huronia District. In 1984 populations declined sharply in this area as well as in infested areas in the Maple and Cambridge districts. Only light-to-moderate damage remained in some areas of the Huronia District, and the insect was absent from the other areas. The pattern of this decline is province-wide since the peak of the outbreak in 1982.

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Results of damage surveys, population sampling and egg-mass counts of this perennial pest will be published with those of other regions at a later date in a report specifically devoted to this insect. That report will provide a complete description and analysis of developments in the spruce budworm situation in Ontario in 1984 and will give infestation forecasts for the province for 1985.

Larch Casebearer, *Coleophora laricella* (Hbn.)

Medium and heavy infestations of the larch casebearer occurred over a total of approximately 150 ha in the Region in 1984. The largest area of infestation was in the Minesing Swamp, Vespra Township, Huronia District where 100 ha of native tamarack (*Larix laricina* [Du Roi] K. Koch) were moderately damaged. Elsewhere in the Huronia District about 10 ha of European larch (*L. decidua* Mill.) were severely defoliated in West Gwillimbury Township. Severe browning of European larch also occurred on another 10 ha in Whitchurch Township, Maple District, and in Uxbridge Township approximately 20 ha of tamarack were moderately affected. Small areas of similar damage occurred at several other locations in Maple District. In the Cambridge District moderate defoliation of both European larch and tamarack was reported in small areas in Nassagaweya and Puslinch townships. At the Orono Forest Station, Lindsay District a small 0.5-ha block of mature European larch sustained light damage.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

Populations of this serious pest of red oak declined to the lowest levels recorded in many years. In the Huronia District, where the insect has been a persistent problem, a spray program was carried out in 1983 over much of the Main Tract of the Dufferin County Forest and the adjacent Tosorontio Tract of the Simcoe County Forest. Larval population reduction and foliage protection were good in the year of application and populations remained very low in 1984 in that area. Elsewhere in the Huronia District populations were also generally at very low levels. Light defoliation was recorded in one area near Farlain Lake in Tiny Township.

In the Maple District, light defoliation was noted in an area of about 50 ha in Uxbridge Township. Incidence of the pest was widespread in the Niagara District; however, only trace amounts of defoliation occurred.

Results of the annual egg survey to forecast populations for the next year are summarized in Table 2. The program for monitoring populations with pheromone traps was repeated this year and the results are summarized in Table 3.

Table 2. Summary of oak leaf shredder egg counts and defoliation forecasts for three districts for 1985.

Location	Plot no. or property owner	Mean no. of eggs per 38-cm sample 1983	1984	Defoliation forecast for 1985 [a]
Huronia District				
Awenda Provincial Park	4	3.2	1.6	L
	5	0.4	0	N
	11	1.2	0.5	L
Wildman Tract	4	1.8	1.5	L
	7	0	0.1	L
Midhurst	1	0	0.1	L
Orr Lake Tract	Danials	-	0.9	L
Hendrie	1	0.8	0.4	L
Dufferin County Forest	3	0	0	N
	9	1.4	0.5	L
	10	2.2	0.4	L
	95	1.1	0.2	L
	12	0.2	0	N
	Check plot 3	6.0	1.0	L
Maple District				
Uxbridge Forest	1	2.0	2.6	L
	2	3.5	9.1	M
Niagara District				
Town of Pelham	Iwasykiw	10.2	0.6	L
	Hinan	0.6	0	N
	Conc. VI, Lot 20	0	0	N
Twp of West Lincoln	Wilkins	0.2	0	N
Town of Thorold	Derwinski	0	0.1	L
Twp of N. Cayuga	Martin	0.1	0	N

[a] N = nil, L = low, M = moderate

Table 3. Results of oak leaf shredder pheromone trapping in three districts in 1984.

Location	Plot no. or property owner	Concentration of pheromone (%)	Total adults captured	Avg no. per trap	Defoliation (%)
Huronia District					
Awenda Provincial Park	4	0.03	748	150	15
	5	0.003	43	9	2
	11	0.3	791	158	7
Wildman Tract	4	0.03	478	96	6
	7	0.3	216	43	3
Midhurst	1	0.003	7	1	4
Orr Lake Tract	Danials	0.003	315	63	4
Hendrie	1	0.003	18	4	3
Dufferin County Forest	3	0.3	50	10	1
	9	0.003	17	4	5
	10	0.03	270	68	6
	95	0.003	30	6	5
	12	0.03	26	5	4
	Check plot 3	0.3	190	38	12
Maple District					
Uxbridge Forest	1	0.03	2,222	444	18
	2	0.3	2,505	501	20
Niagara District					
Town of Pelham	Iwasykiw	0.003	431	86	1
	Hinan	0.03	443	88	1
	Conc. VI, Lot 20	0.003	195	39	1
Twp of West Lincoln	Wilkins	0.3	105	26	1
Town of Thorold	Derwinski	0.3	670	167	1
Twp of N. Cayuga	Martin	0.03	290	58	1

Birch Leafminer, *Fenusa pusilla* (Lep.)

This perennial pest of ornamental birches (*Betula* spp.) was again prevalent on untreated trees across the Region. In the forest setting only scattered trees were affected, usually to a light-to-moderate degree. Areas of damage occurred in Baxter, West Gwillimbury, Medonte, Flos, Vespra and Orillia townships, Huronia District; in Uxbridge and Georgina townships, Maple District; and in Puslinch Township, Cambridge District.

Fall Webworm, *Hyphantria cunea* (Dru.)

The heaviest damage by this recurring pest occurred in the north half of the Huronia District, in East Gwillimbury Township, Maple District and in Belmont Township, Lindsay District. At these locations black ash (*Fraxinus nigra* Marsh.) was the most commonly affected host. Damage occurred in small pockets, usually less than 0.2 ha in size, where moderate and heavy defoliation were recorded. In some instances entire trees were completely defoliated and entirely enshrouded in the insects' webbing (see Frontispiece).

Elsewhere in the Region, generally lower populations prevailed, affecting a wide variety of deciduous hosts.

Gypsy Moth, *Lymantria dispar* (L.)

The larval and adult trapping program, which was initiated in 1983 in southern Ontario provincial parks, was repeated in 1984. Although larval trapping in the Central Region was negative in all instances, positive catches of male moths in the pheromone traps were made at 14 of the 16 parks where these traps were deployed (Fig. 1). Rock Point Provincial Park, Niagara District was not included in the survey in 1984. Results are compared with 1983 results in Table 4. The incidence of the male moths appears to be more widespread in 1984. A similar trend has been reported by the Plant Quarantine Division of Agriculture Canada which also maintains a pheromone trapping program in southern Ontario.

Life forms of the gypsy moth, other than male moths, were found in the Cambridge and Niagara districts. In the Niagara District a newly infested area was detected in the Silver Bay Park area, within the City of Port Colborne. At this location, in early August, egg-laying females were detected on mature red oak within an area of approximately 32 ha in a summer home area. Egg masses were also found in a small clump of bur oak (*Quercus macrocarpa* Michx.) approximately 13 km to the northwest of Silver Bay Park, also within Port Colborne, and a single egg mass was found on an ornamental silver maple (*Acer saccharinum* L.) within the town of Fort Erie, approximately 8 km east of Silver Bay Park. Also in early August, male moths and egg masses on

CENTRAL REGION

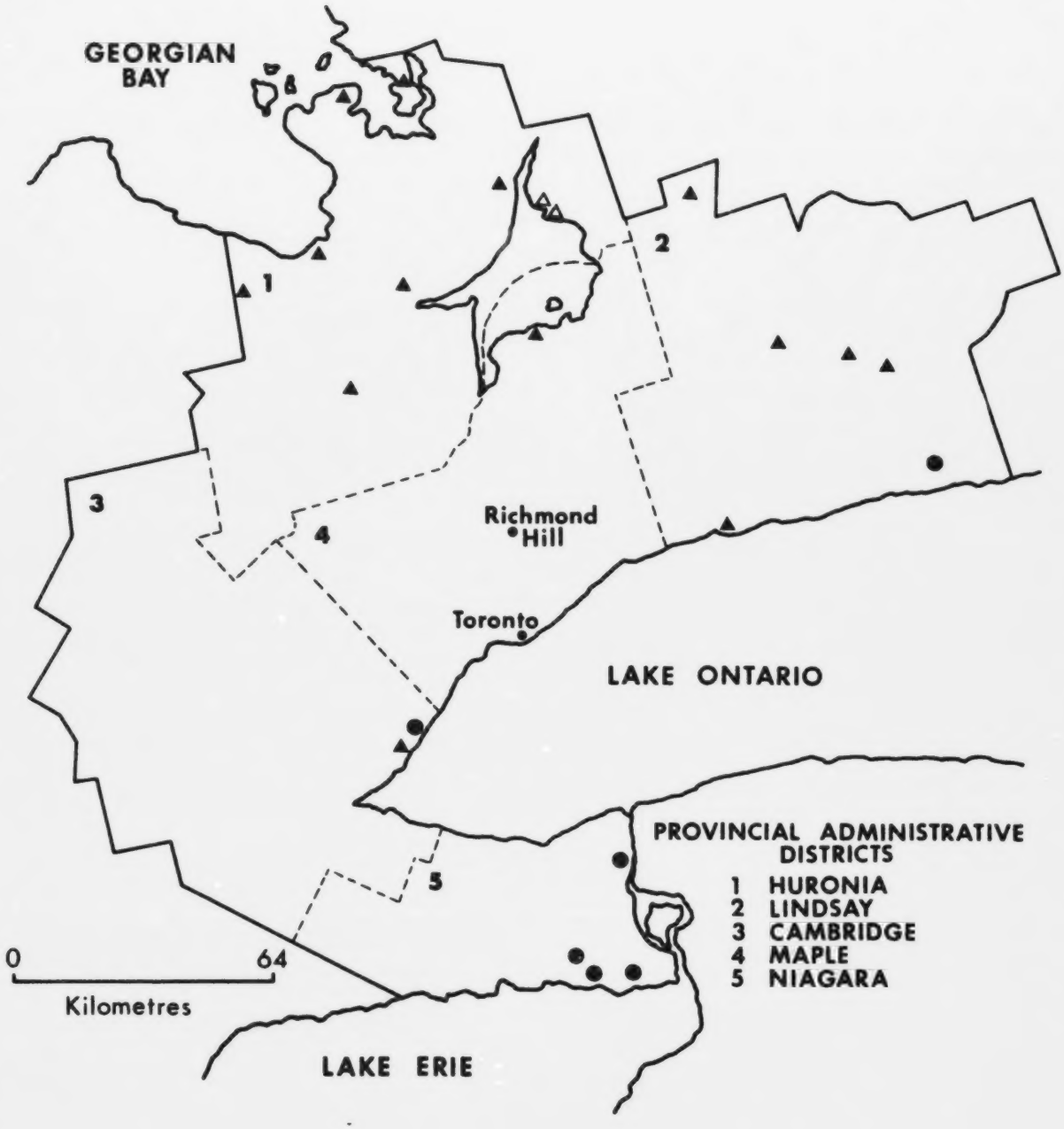
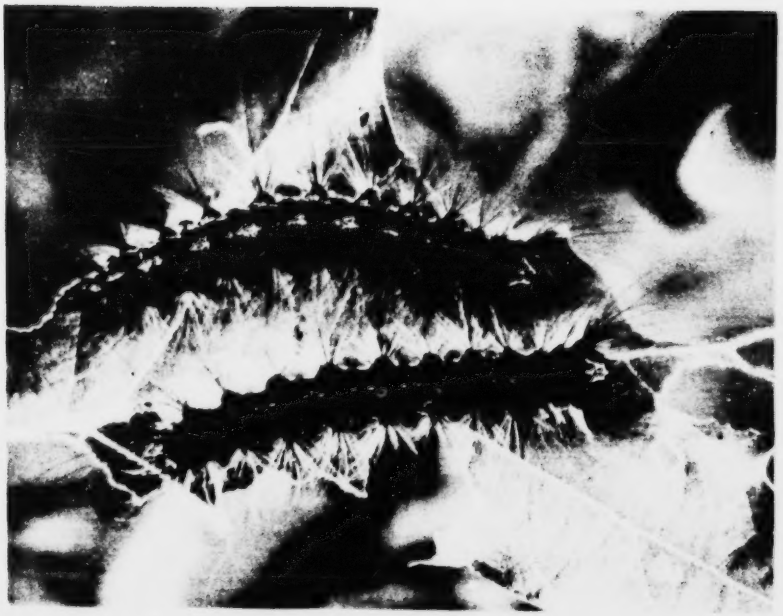


Figure 1. Gypsy Moth, *Lymantria dispar* (L.)
Locations at which pheromone traps were deployed
negative results . . . . . △
positive results . . . . . ▲
Locations at which collections of the insect were made (other than male moths) . . . . . ●



Larvae of the gypsy moth, *Lymantria dispar* (L.)

Red oak (*Quercus rubra* L.) decline and mortality near Farlain Lake, Huronia District

bur oak were detected at the School of Horticulture in the city of Niagara Falls. In the Cambridge District egg masses and cast pupal skins were found in an oak woodlot within the boundaries of the town of Oakville. A single female adult and egg mass were collected in a sugar maple (*Acer saccharum* Marsh.) stand in Hamilton Township, Lindsay District. In all of the above-mentioned areas, numbers of the gypsy moth were very low and no defoliation could be attributed to the insect. No larvae (see photo page) of the gypsy moth were encountered.

Table 4. Summary of gypsy moth pheromone and burlap trappings in 1984.

Location (Park)	No. of burlap traps	No. of larvae caught	No. of pheromone traps	No. of moths caught 1983	No. of moths caught 1984
Huronia District					
Awenda	10	0	2	1	11
Bass Lake	10	0	2	2	1
Devil's Glen	10	0	2	2	1
Earl Rowe	10	0	2	0	2
Mara	10	0	2	-	0
McRae Point	10	0	2	0	0
Six Mile Lake	10	0	2	0	3
Springwater	10	0	2	2	2
Wasaga Beach	10	0	2	6	1
Maple District					
Sibbald Point	10	0	2	0	3
Cambridge District					
Bronte Creek	10	0	2	25	15
Lindsay District					
Balsam Lake	10	0	2	2	2
Darlington	10	0	2	11	16
Emily	10	0	2	5	3
Mark S. Burnham	10	0	2	11	12
Serpent Mounds	10	0	2	10	4

Larch Sawfly, *Pristiphora erichsonii* (Htg.)

Damage from this pest in 1984 was at the lowest levels seen in several years. Defoliation of up to 10% was observed on European larch plantings in Tosorontio and Flos townships, Huronia District and in Uxbridge Township, Maple District. Elsewhere only trace population levels of this insect were found.

Minor Insects

Maple Leafcutter, *Paraclemensia acerifoliella* (Fitch)

In the Cambridge District population levels and extent of damage from this late season defoliator were similar to that of the past several years. Approximately 16 ha of sugar maple sustained an average of 50% defoliation on the Robertson Tract of the Halton Regional Forest. On Beausoleil Island in the Georgian Bay Islands National Park, Huronia District, moderate defoliation (about 30%) occurred over an area of approximately 20 ha. Increased numbers were evident in the Lindsay District, particularly in Belmont Township where 2-3 ha in a 10-ha sugar maple bush were severely defoliated with virtually 100% of the foliage being affected. Also in the same township, a similar level of damage on the understory trees occurred in a 5-ha area.

Flat Leaftier, *Psilocorsis reflexella* Clem.

Late-summer damage by this pest and associated insects was again evident in parts of the work area. In the Huronia District the most notable damage occurred on Beausoleil Island of the Georgian Bay Islands National Park and at nearby Six Mile Lake Provincial Park. At these locations foliar damage to white oak (*Quercus alba* L.) was approximately 40%, with lesser damage of about 20% occurring on red oak. Insects contributing to the overall defoliation included the oak leaftier, *Psilocorsis quercicella* Clem., the oak trumpet skeletonizer, *Epinotia timidella* Clem., the striped oak webworm, *Tetralopha expandens* (Wlk.), and the redhumped oakworm, *Symmerista canicosta* Francl.

In the Lindsay District damage occurred on both red oak and trembling aspen (*Populus tremuloides* Michx.). Locations of foliar damage, varying from light to heavy, occurred in Manvers, Clarke and Verulam townships.

Table 5. Other forest insects.

Insect	Host(s)	Remarks
Acleris variana (Fern.) Eastern blackheaded budworm	wS, eH	very low populations in the north part of the Huronia District
Adelges sp. (probably *cooleyi* [Gill.]) Adelgid	Douglas-fir	low numbers detected on new foliage in a 40-ha Christmas tree plantation in Clarke Twp, Lindsay District
Anisota finlaysoni Riotte Shorthorned oakworm	bur oak	caused 20 to 100% defoliation on roadside trees in the town of Milton and in Blenheim Twp, Cambridge District
Aphrophora cribrata (Wlk.) Pine spittlebug	conifers	medium infestations on Scots pine in Oro Twp, Huronia District; Flamborough Twp, Cambridge District; Uxbridge Twp, Maple District; and on white pine in Bexley Twp, Lindsay District
Archips cerasivoranas (Fitch) Uglynest caterpillar	ecCh	numerous nests on roadside trees, CFB Borden, Huronia District
Arge pectoralis (Leach) Birch sawfly	wB	light damage recorded at Six Mile Lake Provincial Park, Huronia District
Caliroa sp. (probably *fasciata* [Norton]) Oak slug sawfly	rO	heavy skeletonizing of roadside trees at Orono Forest Station, Lindsay District and small groups of trees with 20% foliar damage at Bass Lake Provincial Park, Huronia District and in Thorah and Uxbridge twps, Maple District
Callirhytis punctata (O. & S.) Gouty oak gall wasp	rO	high level of twig mortality on several woodlot trees in the city of Port Colborne, Niagara District
Cecidomyia verrucicola O.S. Linden wart gall midge	Ba	low levels of foliar damage to ornamentals, Niagara-on-the-Lake, Niagara District

(continued)

Table 5. Other forest insects (continued).

Insect	Host(s)	Remarks
Choristoneura conflictana (Wlk.) Large aspen tortrix	tA	populations reduced to trace levels in Georgina Twp, Maple District
Choristoneura pinus pinus Free. Jack pine budworm	jP,scP	Populations continued to decline to trace and low levels; however, light infestations are forecast for Oro Twp, Huronia District and Whitchurch and Uxbridge twps, Maple District.
Coleophora limosipenella Dup. Elm casebearer	elm	moderate damage in combination with leafminers in Halton Hills, Cambridge District; common on ornamentals in Fort Erie, Niagara District
Contarinia baeri (Prell) European pine needle midge	scP	Moderate populations occurred in Tiny Twp, Huronia District in a 4-ha stand.
Corythucha juglandis Fitch Walnut lace bug	Bu	high numbers on ornamentals in Campbellville, Cambridge District
Cryptococcus fagisuga Lindinger Beech scale	Be	approximately 10% of trees heavily infested in a small stand, South Dumfries Twp, Cambridge District
Datana integerrima G. & R. Walnut caterpillar	Wa	average defoliation of 50% on rural roadside trees near Brampton, Maple District; elsewhere populations at very low levels
Datana ministra (Dru.) Yellownecked caterpillar	Ba	defoliation observed in South Monaghan Twp, Lindsay District
Dioryctria resinosella Mut. Red pine coneworm	rP	approximately 25% of new shoots affected on shelterbelt trees in Sunnidale Twp, Huronia District
Ectoedemia lindquisti (Free.) Small birch leafminer	wB	high populations recurred in Awenda Provincial Park and on Beausoleil Island in the Georgian Bay Islands National Park, Huronia District

(continued)

Table 5. Other forest insects (continued).

Insect	Host(s)	Remarks
Epinotia aceriella (Clem.) Maple trumpet skeletonizer	sM	Light and occasionally moderate damage occurred at several locations across the Region.
Eriophyes tiliae Nal. Gall mite	Ba	moderate levels of foliar damage to ornamentals in Bertie Twp, Niagara District
Fenusa dohrnii (Tischb.) European alder leafminer	European alder	severely infested stock in one compartment at Orono Forest Station, Lindsay District
Fenusa ulmi Sund. Elm leafminer	elm	moderate defoliation to young trees in Vaughan Twp, Maple District; in Mara and Vespra twps, Huronia District and in Halton Hills, Cambridge District
Gonioctena americana (Schaef.) American aspen beetle	tA	light damage (10%) at CFB Borden, Huronia District
Hylobius pales (Hbst.) Pales weevil	scP	low amount of branch flagging as a result of adult feeding on Christmas trees, Whitchurch Twp, Maple District
Hylobius radicis Buch. Pine root collar weevil	rP,scP	damage to 54% of 8-m red pine trees at one point in Sunnidale Twp and in one area of heavy damage to young Scots pine trees in Oro Twp, Huronia District
Lepidosaphes ulmi (L.) Oystershell scale	beech	pocket of 0.5 ha with 60% of fine twigs and some branches killed on about 60% of the trees in Asphodel Twp, Lindsay District
Malacosoma americana F. Eastern tent caterpillar	deciduous	Increased populations were noted across the Region, particularly in the north half of Huronia District and in Pickering and Georgina twps, Maple District.

(continued)

Table 5. Other forest insects (continued).

Insect	Host(s)	Remarks
Malacosoma disstria Hbn. Forest tent caterpillar	rO	trace populations found at Six Mile Lake Provincial Park, Huronia District and in Manvers Twp, Lindsay District
Messa nana (Klug) Early birch leaf edgeminer	wB	up to 60% defoliation on scattered trees in Medonte Twp, Huronia District
Neodiprion abietis complex Balsam fir sawfly	bF	15% defoliation on 7 ha in King Twp, Maple District
Neodiprion lecontei (Fitch) Redheaded pine sawfly	rP	populations low; less than 10% foliar damage on affected trees in Flos and Vespra twps, Huronia District
Neodiprion sertifer (Geoff.) European pine sawfly	rP	one plantation with 23% affected trees with an average of 30% foliar damage in Mono Twp, Huronia District; elsewhere, populations very low
Nephopteryx subfuscella Rag. Striped sumac leafroller	sumac	moderate and severe damage, often 100% defoliation, in many areas in the Huronia District and in Whitchurch Twp, Maple District
Phratora purpurea purpurea Brown Aspen skeletonizer	tA	light damage to fringe trees, Nichol Twp, Cambridge District
Phyllobius oblongus (L.) European snout beetle	dedicuous	several areas of noticeable damage by these adult beetles in the Huronia District
Pikonema alaskensis (Roh.) Yellowheaded spruce sawfly	spruce	generally trace populations; moderate damage to individual trees in Essa Twp, Huronia District
Pineus strobi (Htg.) Pine bark adelgid	wP	approximately 60% trees affected in a 20-ha plantation in Orono Forest Station, Lindsay District

(continued)

Table 5. Other forest insects (concluded).

Insect	Host(s)	Remarks
Pissodes strobi (Peck) White pine weevil	wP	Leader damage of 13% in Nottawasaga Twp, Huronia District and 12% in Albion Twp, Maple District
Plagiodera versicolora (Laich.) Imported willow leaf beetle	W	Leaf skeletonizing caused 30% defoliation at Earl Rowe Provincial Park, Huronia District.
Pristiphora geniculata (Htg.) Mountain-ash sawfly	Mo	light damage common to ornamentals throughout the Region
Profenusa lucifex (Ross) Oak leafmining sawfly	wO	heavy leaf browning on 0.2 ha at Serpent Mounds Provincial Park, Lindsay District
Pulicalvaria piceaella (Kft.) Orange spruce needleminer	spruce	low populations on windbreak trees at Midhurst Forest Station, Huronia District
Rhyacionia buoliana (Schiff.) European pine shoot moth	rP	11% of 1.7-m trees infested in Nottawasaga Twp, Huronia District
Scolioneura betuleti (Klug) Leafmining sawfly	birch	moderate damage in conjunction with the more common birch leafminer on roadside trees in King Twp, Maple District; first North American record of this European species
Tetralopha asperatella (Clem.) Maple webworm	sM	moderate numbers in a 10-ha woodlot in Clarke Twp, Lindsay District; elsewhere low populations common
Zeiraphera canadensis Mut. & Free. and *Z. destitutana* (Walker) Spruce bud moths	wS	present but causing very light damage in most plantations in Huronia, Maple and Cambridge districts
Zellaria haimbachi Busck. Pine needle sheathminer	jP	caused an average of 45% foliar damage on 2 ha of mature trees in Uxbridge Twp, Maple District; low numbers common in the Huronia District

TREE DISEASES

Major Diseases

Armillaria Root Rot, *Armillaria mellea* (Vahl ex Fr.) Kummer

This common fungus, which causes rotting of the inner bark and wood of the roots and root collar of both coniferous and deciduous trees, was encountered frequently in 1984. The disease lives as a saprophyte on stumps and recently dead trees. It is often considered a secondary disease attacking living trees under stress from other pathogens, insects or abiotic agents. The fungus also seems capable of being a primary pathogen, since in many instances other damaging agents are not apparent.

At one location in a 20-m red pine plantation in Uxbridge Township, Maple District the disease was found affecting 2% of the living trees. An approximately equal number of recently dead trees was also infected. The stand has had a history of scattered mortality. Recently dead trees were examined in a nearby stand of similar age and size and all were infected with Armillaria root rot.

Armillaria root rot was found affecting red oak in Tiny and Mulmur townships, Huronia District; in Uxbridge Township, Maple District and in the city of Oakville, Cambridge District. Presence of the fungus was also recorded on woodlot sugar maple in Adjala and Tay townships and on Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) Christmas trees in Tiny Township, all in the Huronia District.

Eutypella Canker, *Eutypella parasitica* Davidson & Lorenz

A number of years have elapsed since the last survey of this disease. In 1984, sugar maple stands were examined for the presence of the canker in conjunction with a dieback survey. Eutypella canker, caused by the fungus, *Eutypella parasitica*, affects all maples, with sugar maple being the most susceptible. The initial infection occurs at a branch scar or wound on the main stem. It causes a depressed area surrounded by callus tissue which enlarges with age. Young trees up to 10 cm DBH can be killed by the fungus. On larger trees the cankers can persist for many years. They seldom kill the tree outright but make it susceptible to windsnap at the cankered location (see Frontispiece).

A summary of the percentage of affected trees by Eutypella canker is listed in Table 8 (see page 24). In the survey, cankers as a result of Eutypella infection, all of which occurred on the main stem, were found from ground level to a height of 5 m. The length of the cankers ranged from 40 cm to 170 cm with an average length of 86 cm. The disease was present at four of the seven surveyed locations. A survey conducted in an additional area in Nassagaweya Township, Cambridge District found 13% of trees affected by the disease.

Scleroderris Canker, *Gremmeniella abietina* (Lagerb.) Morelet

In 1984 a total of 12 red pine stands were examined specifically for the European race of this disease. In addition, numerous pine stands and individual trees were checked during routine surveys throughout the Region (Fig. 2). Results in all instances were negative. Aerial surveys conducted over areas of host pine stands were carried out in the spring and several areas of dead and declining conifers were noted. Subsequent ground checks of these areas revealed damage from a variety of causes including Armillaria root rot, limestone chlorosis, drought, porcupine, fire, salt and snow, but revealed no evidence of Scleroderris canker.

The North American race of the disease, which is a serious problem in the adjacent Algonquin Region, has not yet been detected, except for one isolated record, in the Central Region. In 1980, the fungus was detected in a red pine stand in Melancthon Township, Huronia District, but annual checks of this area since that time have failed to find a recurrence of the disease.

Tip Blight, *Sphaeropsis sapinea* (Fr.) Dyko & Sutt.

General observations and routine checks indicate that the tip blight continues to be a problem. Areas of heaviest damage noted were in Flamborough and Puslinch townships, Cambridge District and in East Gwillimbury and Whitchurch townships, Maple District, where 20- to 30-year-old Scots pine stands were heavily affected. In the Lindsay District, roadside plantings of Austrian pine (*Pinus nigra* Arnold) in Eldon Township were heavily effected.

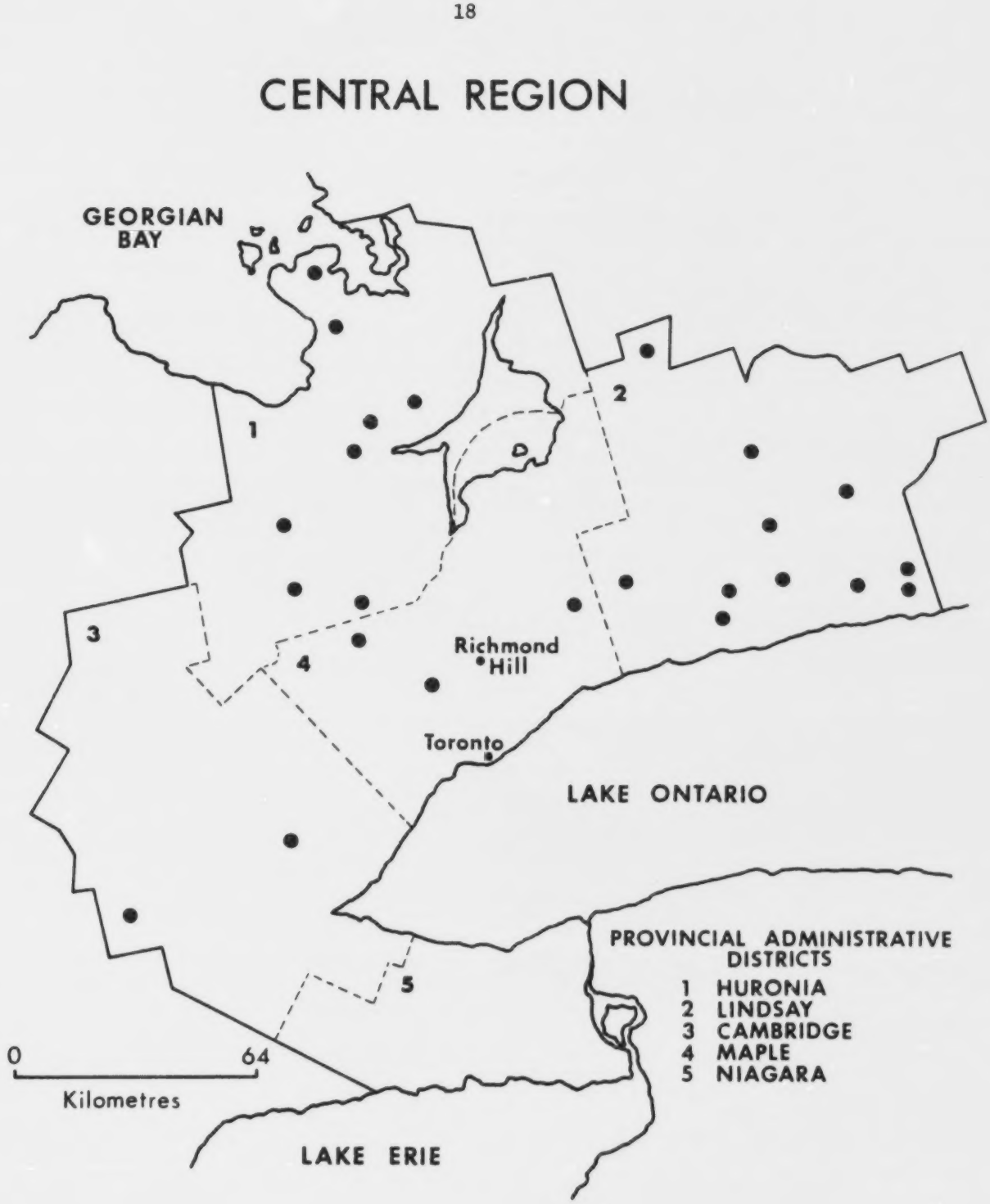


Figure 2. Scleroderris Canker, *Gremmeniella abietina* (Lagerb.) Morelet

Locations at which pine (*Pinus* spp.) plantations were surveyed to determine the presence of the European race of this disease in 1984

negative results . . . . . ●

Table 6. Other forest diseases.

Organism	Host(s)	Remarks
Caliciopsis pinea Peck Canker	wP	two pockets of 10-15 dead and dying trees each, in a 2.4-ha sapling plantation in Amaranth Twp, Huronia District
Cenangium ferruginosum Fr. : Fr. Twig blight	scP	caused branch and top killing in a number of Christmas tree plantations in Adjala Twp, Huronia District
Chrysomyxa pirolata (Körn) Wint. Spruce cone rust	wS	approximately 11% of cones from semimature trees affected in Uxbridge Twp, Maple District; trace incidence in Vespra Twp, Huronia District
Coleosporium asterum (Diet.) Syd. Pine needle rust	rP	average defoliation of 50% on 10% of 2-year-old seedlings in Uxbridge Twp, Maple District
Cronartium ribicola J.C. Fisch. ex Rabh. White pine blister rust	wP	main stem infections on 6% of trees 10-m high in Albion Twp, Maple District
Discula umbrinella (Berk. & Br.) Sutt. Anthracnose	sM,rO	caused noticeable browning of sugar maple in Orillia Twp and red oak at Wasaga Beach, Huronia District
Gloeosporium sp. Leaf spot	honey-suckle	light damage on nursery stock at Midhurst Forest Station, Huronia District
Guignardia aesculi (Pk.) Stewart Leaf blotch	horse chestnut	heavy infections common on ornamentals in the Cambridge and Niagara districts
Gymnosporangium globosum Farl. Globose gall rust	J,Ha	light infections on juniper common in many areas of the Region; heavy fruiting on alternate host, hawthorn, in Serpent Mounds Provincial Park, Lindsay District

(continued)

Table 6. Other forest diseases (continued).

Organism	Host(s)	Remarks
Isthmiella crepidoformis (Darker) Darker Needle cast	wS	low number of plantation trees affected in Oro Twp, Huronia District
Kabatiella apocrypta (Ell. & Ev.) Arx Anthracnose	sM	very light incidence of this leaf disorder compared with past years
Kabatina thujae Schneid. & Arx var. *juniperi* (Schneid. & Arx) Morelet var. *thujae* Needle blight	ground juniper	associated with dieback of ground juniper in Baxter Twp and on islands in Georgian Bay, Huronia District
Leucostroma kunzei (Fr.) Munk Cytospora canker	wS	common in plantations in Puslinch and Nassagaweya twps, Cambridge District
Lophodermium juniperinum (Fr.) de'Not. Needle cast	ground juniper	associated with dieback in the Georgian Bay area, Huronia District
Marssonina brunnea (Ell. & Ev.) Magn. Leaf spot	hybrid poplar	one compartment with 80% of whips heavily affected at Orono Forest Station, Lindsay District
Marssonina juglandis (Lib.) Magn. Leaf spot	Bu,Wa	caused premature leaf drop of butternut (*Juglans cinerea* L.) in much of the Lindsay District; light damage in walnut plantations in Cambridge District
Mycosphaerella populicola G.E. Thomps. Leaf spot	bPo	heavy premature leaf drop, by early September in Manvers, Belmont and Smith twps, Lindsay District
Phaeocryptopus gaeumannii (Rohde) Petr. Swiss needle cast	Douglas-fir	29% of the trees affected with 40% foliar damage on a 6-ha Christmas tree plantation in Tiny Twp, Huronia District

(continued)

Table 6. Other forest diseases (concluded).

Organism	Host(s)	Remarks
Podosphaera clandestina (Wallr.: Fr.) Lév. Powdery mildew	juneberry	light infection on nursery stock in Midhurst Forest Station, Huronia District
Rhabdocline pseudotsugae Syd. ssp. *pseudotsugae* Needle cast	Douglas-fir	100% of trees affected with 18% foliar damage on a 40-ha Christmas tree plantation in Clarke Twp, Lindsay District
Scirrhia pini Funk & Parker Red band disease	Austrian pine	new light infection point detected at Awenda Provincial Park, Huronia District
Venturia macularis (Fr.) Müller and v. Arx Shoot blight	tA	approximately 80% shoot mortality on small group of fringe regeneration in CFB Borden, Huronia District

DIEBACKS AND DECLINES

Ash Dieback

Ash dieback has long been recognized as a problem in northeastern North America. White ash (*Fraxinus americana* L.) is the main host of this condition but red ash (*F. pennsylvanica* Marsh.) and green ash (*F. pennsylvanica* var. *lanceolata* [Borkh.] Sarg.) can also be affected.

Symptoms of ash dieback include bud flush failure and chlorosis, dwarfing, and tufting and thinning of the foliage that does flush. This is followed by twig and branch dieback that progresses downwards. Symptoms may be evident for 3-10 years before the tree dies. Radial growth is reduced and apical growth is usually terminated during the decline period. Trees rarely recover once the dieback is initiated.

Stresses on ash which have been associated with the dieback include drought, low temperatures, canker fungi, leaf spot fungi, air pollution, viruses and more recently mycoplasma-like organisms (MLO). MLOs are somewhat like viruses and are found in the food-conducting cells of the infected host. They cause a condition which is termed "ash yellows" which in turn may be responsible for ash dieback. In New York State it has been reported that 52% of slow-growing ash trees and 82% of trees with dieback were infected with MLO. Evidence there implicates MLO as the most important cause of ash dieback. Symptoms of ash yellows include the previously mentioned symptoms of ash dieback as well as yellowish foliage, epicormic branching or broom formation along the lower trunk or at ground level, premature autumn color and susceptibility to freezing damage in the form of frost cracks.

In 1984 surveys were conducted for ash dieback in the Maple and Cambridge districts and the condition was evident in many of the stands examined. In most instances only occasional trees were affected; however, an exception to this occurred in Albion Township, Maple District where 15 dead and declining trees were detected in a small 0.1-ha area. More prevalent dieback was encountered on fringe and roadside trees, particularly in the Cambridge District. A light incidence of the anthracnose, *Discula umbrinella* (Berk. & Br.) Sutt., occurred in most areas examined and the fungus, *Valsa pruniosa* (Fr.) Défago, was identified from samples of cankers on dead twigs and branches. Symptoms of ash yellows in the form of epicormic branching or broom formation were found at two locations but laboratory analysis of samples from the affected trees did not detect evidence of MLO.

Maple Dieback

As part of a survey across southern Ontario by the Forest Insect and Disease Survey Unit (FIDS), seven maple stands in the Central Region were examined for maple dieback in 1984. Stands were selected randomly and had a minimum of 40% sugar maple content. Red maple (*Acer rubrum* L.) was also to be rated but none was encountered in the seven surveyed stands. A minimum of 100 trees were examined at each location.

Both current dieback (Table 7) and cumulative dieback (Table 8) of the trees were rated. Current dieback was classified as dieback that occurred in 1984 and timing of the survey (August) was such that most of the current dieback should have occurred by the time the stands were examined. Cumulative dieback was classified as the total crown deterioration that was evident regardless of when the dieback occurred. Results indicate that no abnormal amount of dieback was present in any of the stands examined.

Other pests encountered during the survey included the maple leafcutter, maple webworm and the maple trumpet skeletonizer, all of which were found at trace levels. Other diseases which occurred at very low levels included Armillaria root rot, found on one tree at both the Tay and Adjala locations; white spongy rot, white trunk rot, *Fomes connatus* (Weinm.) Gill., at the Tay, Oro and Adjala sites; *Phellinus igniarius* (Fr.) Quél., at the Adjala plot; and dieback and canker, *Steganosporium ovatum* (Pers. ex Mérat) Hughes, at the Tay Township location.

Oak Decline

Oak study plots which were established in 1977 have been monitored on an annual basis since that time. Oak leaf shredder populations in the area of the plots have generally been declining in the past few years and this may be related to the overall gradual improvement of tree crowns. The trees that died on the plots this year were affected with Armillaria root rot, except in the case of one tree which was severely damaged by roadbuilding construction. The amount of accumulated crown deterioration is listed in Table 9 (see also photo page).

Current dieback was also rated, but did not account for more than 10% of the currently live crown except in trees that had died. In most instances there was little or no current dieback.

Table 7. Summary of current sugar maple dieback at seven locations in the Central Region in 1984 (expressed as a percentage of total trees examined).

Location (Twp)	Avg DBH (m)	Avg ht (m)	Percentage of crown dead					No. of trees dead
			0-5	6-20	21-40	41-60	60	
			- - - - No. of trees - - - -					
Huronia District								
Tay	22	20	87	10	0	0	0	3
Oro	24	21	95	5	0	0	0	0
Adjala	26	20	91	8	0	0	0	1
Maple District								
King	26	22	93	7	0	0	0	0
Lindsay District								
Hamilton	34	21	91	9	0	0	0	0
Douro	17	17	91	9	0	0	0	0
Niagara District								
South Cayuga	9	11	99	0	1	0	0	0

Table 8. Summary of cumulative sugar maple dieback and Eutypella canker at seven locations in the Central Region in 1984 (expressed as a percentage of total trees examined).

Location (Twp)	Percentage of crown dead					No. of trees dead	Eutypella canker % affected
	0-5	6-20	21-40	41-60	60		
	- - - -	- No. of trees	- - - - -				
Huronia District							
Tay	65	30	1	1	0	3	0
Oro	85	12	2	1	0	0	1
Adjala	80	14	3	0	2	1	5
Maple District							
King	78	18	3	1	0	0	3
Lindsay District							
Hamilton	72	23	5	0	0	0	1
Douro	77	21	2	0	0	0	0
Niagara District							
South Cayuga	99	0	1	0	0	0	0

Table 9. Summary of oak decline at five locations in the Central Region from 1977 to 1984.

Location	Avg DBH (cm)	Avg ht (m)	Year	Percentage of crown dead				No. of trees dead	Oak leaf shredder activity[a]
				0-20	21-40	41-60	>60		
				- - - No. of trees - - -					
Central Region - Huronia District									
Tiny Twp	25.9	21.9	1977	54	7	27	12	0	t[b]
Awenda Provincial			1978	48	5	22	6	4	t
Park			1979	58	9	3	4	8	t[b]
			1980	61	8	4	4	8	t
			1981	57	14	2	3	8	t
			1982	63	9	1	3	8	t
			1983	61	11	2	2	9	t
			1984	62	9	4	1	9	t
Tiny Twp	26.0	22.0							
Tiny Twp	26.0	22.0	1977		not sampled				s
Fairlain Lake			1978		"	"			s
			1979		"	"			s
			1980	0	4	45	25	26	s
			1981	0	11	35	25	29	l
			1982	7	30	22	9	32	l
			1983	11	32	19	5	33	l
			1984	31	25	6	5	33	t
Mulmur Twp	28.2	21.0	1977	64	15	20	1	0	s
Dufferin County			1978	64	15	19	1	1	l[b]
Forest			1979	68	15	15	1	1	t
			1980	57	28	13	1	1	l
			1981	43	34	16	2	1	m
			1982	44	39	10	1	2	m
			1983	48	33	11	2	2	l[b]
			1984	53	33	6	0	4	t

(continued)

Table 9. Summary of oak decline at five locations in the Central Region from 1977 to 1984 (concluded).

Location	Avg DBH (cm)	Avg ht (m)	Year	Percentage of crown dead				No. of trees dead	Oak leaf shredder activity [a]
				0-20	21-40	41-60	>60		
				- - - No. of trees - - -					
Central Region - Maple District									
Uxbridge Twp Durham Forest	26.1	21.2	1977	42	9	31	18	0	m
			1978	42	9	31	11	7	l
			1979	40	13	26	6	15	m
			1980	38	14	25	7	16	l [b]
			1981	27	22	26	6	19	l
			1982	29	33	12	6	20	m
			1983	33	31	9	4	23	m
			1984	40	27	6	3	24	l
Central Region - Lindsay District									
Clark Twp Durham Ganaraska	22.9	20.6	1977	38	11	32	19	0	l
			1978	4	36	39	13	8	l
			1979	3	32	41	16	8	l
			1980	2	26	47	16 [c]	9 [c]	l
			1981	2	26	47	16 [c]	9 [c]	t
			1982	1	32	44	14 [c]	9 [c]	n
			1983	5	57	26	3	9	n
			1984	76	10	2	2	10	n

[a] n = nil, t = trace, l = light, m = moderate, s = severe

[b] aerially sprayed for control of oak leaf shredder

[c] data correction for years 1980-1982

ABIOTIC DAMAGE

Drought

Delayed effects of the extremely dry period during the summer of 1983 were noticeable in 1984. Damage was most evident in red pine plantations on sandy sites. Scattered mortality was common in young plantations on the Main Tract of the Dufferin County Forest and in Flos Township, Huronia District. In older plantations red pine mortality occurred in pockets of up to 50 trees. Damage was also evident in Vespra and Mulmur townships, Huronia District.

Frost Damage

Only very minor damage due to late spring frost was evident in 1984. Slight damage occurred to balsam fir (*Abies balsamea* [L.] Mill.) in Medonte Township, Huronia District and on plantation white spruce (*Picea glauca* [Moench] Voss) in Amaranth Township, Huronia District and in Wilmot Township, Cambridge District.

Salt Damage

Applications of salt on major highways during winter months was responsible for foliar damage to roadside plantations, windbreak and ornamental trees throughout the Region in 1984. White and red pine were the most commonly affected species. Cedar and junipers (*Juniperus* spp.) also sustained some damage. Typical damage occurred in Flos Township, Huronia District and in Albion Township, Maple District where an average of 67% of plantation white pine were affected with 24% foliar damage. The damage decreased with increased distance from the road.

Winter Drying

Damage from winter drying was evident in young white pine plantations in the Cambridge District. Typical damage occurred in Erin Township where 60% of the trees in a 8-ha plantation of 0.6-m-high trees were affected, with average defoliation of 20%. Similar damage was also observed in Nassagaweya Township and in King Township, Maple District. In the Lindsay District damage to red pine was noted in several roadside situations. Damage in the Huronia District was more evident on white and Norway spruce (*Picea abies* [L.] Karst.). Severe browning occurred to ornamentals at Earl Rowe, Mara and McRae provincial parks, and at one location in Medonte Township 90% of Norway spruce 2.0 m high suffered heavy damage. In the Cambridge District heavy damage also occurred on occasional trees in Norway spruce windbreaks. It is felt that the damage to spruces was complicated by the drought during the summer of 1983.

Table 10. Other abiotic damage.

Type of damage	Host(s)	Remarks
Late spring leaf scorch	sM	heavily affected roadside trees in Smith Twp, Lindsay District; light damage common on roadside trees and ornamentals in Fort Erie, Niagara District
Limestone chlorosis	rP	pockets of dead and dying trees due to high soil pH detected in town of Vaughan, Maple District and in Otonabee Twp, Lindsay District
Wind damage	coniferous and deciduous	wind storm on 30 April, 1984 caused scattered blowdown throughout the Region. Notable damage occurred to jack pine in a recently thinned stand in Albion Twp, Maple District and adjacent to a clearcut in Vespra Twp, Huronia District

SPECIAL SURVEYS

White Spruce Plantation Survey

In 1984 FIDS carried out a special survey of white spruce plantations throughout Ontario. In the Central Region, eight plantations were examined for the presence and impact of insects and diseases. Stands were selected on a random basis and 150 trees were examined at each location. Two visits were made to each area and where possible the same trees were examined at each visit.

Positive incidences of insects that were monitored are listed in Table 11. These include the spruce budworm, spruce coneworm, *Dioryctria reniculelloides* Mut. & Mun., spruce bud moths and the yellowheaded spruce sawfly. The trees were also examined for white pine weevil damage; however, this insect was absent at all locations. Other insects of a miscellaneous nature detected during the survey were: spruce needleminer, *Endothenia albolineana* (Kft.), found on 33% of the trees in Amaranth Township and on 28% of the trees in Wilmot Township; aphids (Aphididae), found on 51% of the trees at the Wilmot location and 9% of the trees at the Amaranth location; eastern spruce gall adelgid, *Adelges abietis* (Linn.), and cicada, *Tibicen canicularis* Harr., trace incidence at the Wilmot plot; ragged spruce gall adelgid, *Pineus similis* (Gill.), and orange spruce needleminer, trace populations found at the North Gwillimbury location.

The diseases and abiotic problems detected by the survey are also listed in Table 11. Included are chlorosis, frost damage, spruce cone rust and stand openings. The cause of the stand openings could not be determined except at the Bexley Township location, where past infestations of the yellowheaded spruce sawfly had caused tree mortality. The stands were also surveyed, with negative results, for: Armillaria root rot; spruce needle rust, *Chrysomyxa ledi* (Alb. & Schw.) d By.; spruce broom rust, *C. arctostaphyli* Diet.; dwarf mistletoe, *Arceuthobium pusillum* Pk.; and recent mortality from any cause. The sites were also examined for the presence of bearberry, *Arctostaphylos* spp., and pyrolas, *Pyrola* spp., the alternative hosts of spruce broom rust and spruce cone rust, respectively. Neither of these alternate hosts were found at the plantation locations.

Table 11. Summary of the results of a white spruce plantation survey carried out in the Central Region in 1984.

Location (Twp)	Area (ha)	Avg ht of trees (m)	Estimated no. of trees/ha	Spruce budworm: Trees affected (%)	Spruce coneworm: Trees affected (%)	Spruce bud moths: Trees affected (%)	Spruce budworm and spruce coneworm: Defoliation (%)	Yellowheaded spruce sawfly: Trees affected (%)	Yellowheaded spruce sawfly: Defoliation (%)
Cambridge District									
Wilmot	5	2.1	1,600	8	0	17	1	0	0
Nichol	12	10.0	1,000	80	10	10	6	0	0
Maple District									
North Gwillimbury	5	0.9	2,500	0	0	6	0	2	7
Huronia District									
Vespra	12	7.0	1,000	5	0	57	2	0	0
Amaranth	10	1.1	2,000	2	0	8	1	3	7
Lindsay District									
Bexley	16	5.2	1,400	0	0	0	1	0	0
Hamilton	2	10.1	4,000	0	0	0	0	0	0
Manvers	1	1.9	2,800	0	0	0	0	0	0

(continued)

Table 11. Summary of the results of a white spruce plantation survey carried out in the Central Region in 1984 (concluded).

Location (Twp)	Chlorosis		Frost		Cone rust		No. of stand openings
	Faded green	Yellow					
	Trees affected (%)	Trees affected (%)	Trees affected (%)	Foliar damage (%)	Total no. of cones examined	Cones affected (%)	
Cambridge District							
Wilmot	1	0	2	4	200	0	3
Nichol	0	0	0	0	200	0	1
Maple District							
North Gwillimbury	20	0	0	0	100	0	4
Huronia District							
Vespra	0	0	0	0	100	1	0
Amaranth	7	0	13	3	100	0	3
Lindsay District							
Bexley	0	0	0	0	200	0	8
Hamilton	0	0	0	0	0	0	0
Manvers	0	0	0	0	50	0	1

Table 12. Summary of white spruce cone and flower damage at two locations in the Central Region in 1984.

Location (Twp)	Female flowers		Developed cones		Seed loss in damaged cones (%)	Cones damaged by					
	No. examined	Damaged (%)	No. examined	Damaged (%)		Earlier Lepidoptera insects (%)	Spruce seed moth (%)	Spruce cone maggot (%)	Spruce seed chalcid (%)	Spruce cone rust (%)	Unknown (%)
Maple District											
Uxbridge	200	21	100	40	60	25	0	1	0	11	3
Huronia District											
Essa	--	--	100	60	23	39	18	0	1	0	2

White Spruce Flower, Cone and Seed Survey

In 1984 an exceptional cone crop occurred on all species of spruce in the central Region. This coincided with FIDS plans to carry out a survey of white spruce seed and cone pests. Mature cones were collected at two locations, at Canadian Forces Base Borden in Essa Township, Huronia District and on the Main Tract of the Durham Regional Forest in Uxbridge Township, Maple District. At the latter location a sample was also taken of female flowers.

The flower collection was done in late May during the late flowering stage just after pollination. Laboratory analysis of 200 female flowers indicated that 21% were damaged in some form. Of the damage 26% was definitely the result of insect feeding; the cause of damage to the remainder could not be determined. Both the spruce budworm and the eastern blackheaded budworm were found in equal numbers, and were the most damaging insects found at this stage. Other insects recovered were the spruce micro moth, *Eucordylea atrupictella* Dietz., and the obliquebanded leaf roller, *Choristoneura rosaceana* (Harr.).

Damage to the mature cones collected from both locations in mid-August was primarily the result of the earlier feeding by Lepidopterous larvae, including insect species mentioned above. Other damage was caused by the spruce seed moth, *Laspeyresia youngana* (Kft.), the spruce seed chalcid, *Megastigmus atedius* Wlk., the spruce cone maggot, *Hylemya anthracina* (Czerny) and spruce cone rust (Table 12). The latter was the only disease found affecting the cones.

Seeds within the cones were also examined by FIDS staff to determine the seed reduction in damaged cones. The mean seed count of damaged cones was 23% less than the mean seed count of sound cones at the Essa Township sample point and 60% less than the mean seed count of sound cones at the Uxbridge Township location.

Seed and cone pest surveys will continue in 1985.

Surveys for Pests Found in Adjoining Provinces

Special surveys were conducted for significant pests that have occurred in neighboring provinces or adjacent parts of the United States in 1984. One of these is the European race of Scleroderris canker referred to previously in this report. Another is the birch casebearer, *Coleophora serratella* (L.), an introduced insect which has caused extensive damage to birches and alders (*Alnus* spp.) in Quebec, Newfoundland and the Maritime provinces, but to date has not been confirmed in the province of Ontario. Results of the survey for this insect in the Central Region in 1984 were all negative. Trace populations of casebearers on birch were submitted on four occasions and all were identified as the closely related species, the cherry casebearer, *Coleophora pruniella* Clem.

Pinewood Nematode, *Bursaphelenchus xylophilus* (Steiner and Buhrer) Nickle

The pinewood nematode has been causing severe damage to pine forests in Japan for the past 30 years. In recent years it has been recorded in the northern United States and in Manitoba. In 1984 it was recorded in two locations in southern Ontario, one of which was in the Central Region. The nematode was collected from red pine on the North Tract of the York Regional Forest, Maple District. Staff from the Pest Control Section of OMNR made this collection.

Although it is not currently a major problem in North America, it is considered potentially dangerous.

Acid Rain National Early Warning System

In keeping with its new role as part of a national early warning system for acid rain, the Ontario FIDS Unit has established 13 study plots in stands of the major commercial tree species across the province. The plots are designed to enable forecasting of early detection of damage that may occur to the forest because of acid precipitation. In the Central Region one plot was established in a sugar maple stand in Oro Township, Huronia District. Among the parameters being measured on this plot are vertical and radial growth, crown structure and density, mortality, incidence of insect and disease attack and specific acid rain symptoms. Further reports will be presented as this program develops.

Climatic Data

Climatic data, as listed in Table 13, indicate that only slight fluctuations from the means occurred in temperatures and total precipitation for 1984.

Table 13. Summary of mean temperature and total precipitation at two locations in the Central Region in 1984. [a]

Location	Month	Mean temperature (°C)		Deviation from normal (°C)	Total precipitation (mm)		Deviation from normal (%)
		Normal[b]	Actual		Normal[b]	Actual	
Peterborough Airport	January	-9.3	-12.1	-2.8	44.1	28.7	-34.9
	February	-8.5	-3.1	+5.4	48.9	78.8	+61.1
	March	-2.5	-6.6	-4.1	62.9	56.5	-10.2
	April	6.0	6.9	+0.9	71.8	103.4	+44.0
	May	12.1	9.7	-2.4	57.1	88.3	+54.6
	June	16.8	16.8	0.0	60.4	36.9	-38.9
	July	19.2	18.6	-0.6	77.9	88.8	+14.0
	August	18.1	19.2	+1.1	74.2	112.8	+52.0
	September	14.0	11.9	-2.1	72.9	72.2	-1.0
	October	7.9	9.1	+1.2	59.9	23.5	-60.8
	November	2.1	1.6	-0.5	69.4	76.6	+10.4
	December	-6.0	-2.0	+4.0	74.3	68.3	-8.1
Lester B. Pearson International Airport	January	-6.7	-9.7	-3.0	50.4	30.2	-40.1
	February	-6.1	-1.5	+4.6	46.0	59.0	+28.3
	March	-1.0	-4.6	-3.6	61.1	59.5	-2.6
	April	6.2	7.2	+1.0	70.0	58.7	-16.1
	May	12.3	10.3	-2.0	66.0	102.8	+55.8
	June	17.7	18.2	+0.5	67.1	48.1	-28.3
	July	20.6	19.8	-0.8	71.4	63.3	-11.3
	August	19.7	21.1	+1.4	76.8	63.8	-16.9
	September	15.5	13.9	-1.6	63.5	74.7	+17.6
	October	9.3	10.3	+1.0	61.8	26.1	-57.8
	November	3.3	2.7	-0.6	62.7	69.9	+11.5
	December	-3.5	-0.2	+3.3	64.7	61.4	-5.1

[a] Data obtained from Atmospheric Environment Service, Environment Canada.

[b] Normal temperature and precipitation are based on the period 1930-1980.